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Using radio stars to link the Gaia and VLBI reference frames

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Abstract

© 2016 The Author Published by Oxford University Press on behalf of the Royal Astronomical Society.A possible method for linking the optical Gaia Celestial Reference Frame (GCRF) to the VLBI-based International Celestial Reference Frame (ICRF) is to use radio stars in a manner similar to that in the linking of the Hipparcos Celestial Reference Frame (HCRF) to ICRF. In this work, an obtainable accuracy of the orientation angles between GCRF and ICRF frames was estimated by Monte Carlo simulation. If the uncertainties in the radio star positions obtained by VLBI are in the range of 0.1-4 mas and those obtained by Gaia are in the range of 0.005-0.4 mas, the orientation angle uncertainties are 0.018-0.72 mas if 46 radio stars are used, 0.013-0.51 mas if 92 radio stars are used, and 0.010-0.41 mas if 138 radio stars are used. The general conclusion from this study is that a properly organized VLBI programme for radio star observation with a reasonable load on the VLBI network can allow for the realization of GCRF-ICRF link with an error of about 0.1 mas.

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Keywords

astrometry, reference systems, techniques: interferometric